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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,722	12/05/2003	Jin H. Kim	7240	2630

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2000 Millbrook Drive
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EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	**PAPER NUMBER**
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/729,722	KIM ET AL.	
	Examiner	Art Unit	
	Emmanuel Bayard	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 05 December 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-24 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-24 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 5-8 and 21-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claims 5 and 21 recite the limitation "the equalizer" in line 1, respectively. There is insufficient antecedent basis for this limitation in the claim.

4. Claims 6-8 and 22-24 are also rejected because they depend on a based rejected claim.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1-24 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-24 of copending Application No. 2005/0123075 A1. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims in the copending Application encompass the claims in the present application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Yousef et al U.S. Patent No 7,113,540 B2.

As per claims 1 and 9, Yousef et al teaches a method of processing a received signal y to produce a channel estimate comprising: (a) decoding the received signal y to form data s (see figs 7 and 8 elements 106 and 806 and col.17, lines 18-24); (b) forming a convolution matrix from the data s (see abstract and figs. 7 and 8 elements 104 and Y (n) and col.2, lines 65-67 and col.4, lines 45-50 and col.12, lines 30-45); (c) forming a

matrix F from the data s, wherein the matrix F results from forming the matrix as a convolution matrix (see figs. 7 and 8 elements 108 and 808 col.2, lines 65-67 and col.4, lines 45-50 and col.12, lines 30-45); and, (d) performing a conjugate gradient algorithm to determine the channel estimate, wherein the conjugate gradient algorithm is based on the received signal·y, the matrix , and the matrix F(see fig.7 element 710 and col.16, lines 12-23).

As per claims 2, 10 Yousef et al teaches wherein the performing of a conjugate gradient algorithm comprises determining a quantity q.sub.k according to the following equation: q.sub.k=.sup.Td.sub.k, wherein d.sub.k is dependent upon the received signal y, the matrix, and the matrix F, and wherein q.sub.k is determined by forming a first FFT of the matrix , by forming a second FFT of the matrix. sup.T, by forming a third FFT of d.sub.k, by multiplying the first, second, and third FFTs to produce a multiplication result, and by forming an inverse FFT of the multiplication result (see col.11, line 53-col.12, lines 1-42 and col.23, lines 65-67 and col.24, lines 1-11).

As per claims 3, 7, 11 Yousef et al teaches wherein the forming of a matrix from the data s comprises: forming a matrix S from the data s (see abstract and figs. 7 and 8 elements 104 and Y (n) and col.2, lines 65-67 and col.4, lines 45-50 and col.12, lines 30-45); and, forming the matrix from the matrix S by setting certain values of the matrix S to zero; and wherein the forming of a matrix F from the data s comprises: forming the matrix F from the matrix S by setting to zero the values of the matrix S not set to zero during the forming of the matrix (see col.22, lines 33-45).

As per claims 4, 8, 12 Yousef et al teaches wherein the performing of a

conjugate gradient algorithm comprises determining a quantity qk according to the following equation: q.sub.k=.sup.Td.sub.k, wherein d.sub.k is dependent upon the received signal y, the matrix , and the matrix F, and wherein q.sub.k is determined by forming a first FFT of the matrix , by forming a second FFT of the matrix .sup.T, by forming a third FFT of the d.sub.k, by multiplying the first, second, and third FFTs to produce a multiplication result, and by forming an inverse FFT of the multiplication result (see col.11, line 53-col.12, lines 1-42 and col.23, lines 65-67 and col.24, lines 1-11).

As per claim 5, Yousef et al inherently teaches wherein the performing of a conjugate gradient algorithm to determine the channel estimate h comprises performing the following algorithm: (1) =y-Fh.sub.1, r.sub.1=.sup.T-.sup.Th.sub.1 (2) For k=1 to n, iteratively calculate d.sub.k=r.sub.k+.beta..sub.kd.sub.k-1 (a) h.sub.k+1=h.sub.k+.alpha..sub.kd.sub.k (b) r.sub.k+1=r.sub.k-.alpha- ..sub.kq.sub.k-1 (c) where h.sub.1 is an initial value of the channel estimate, where .beta..sub.1=0, 14 k 2 = r k T r k r k - 1 T r k - 1 , where k = r k T r k d k q k ,where q.sub.k=S.sup.TSd.sub.k (see col.10-col.11 and col.19-col.20, line 15 equations 55, 64).

As per claim 6, Yousef et al teaches wherein the performing of a conjugate gradient algorithm comprises determining the quantity q.sub.k by forming a first FFT of the matrix , by forming a second FFT of the matrix .sup.T, by forming a third FFT of d.sub.k, by multiplying the first, second, and third FFTs to produce a multiplication result, and by forming an inverse FFT of the multiplication result(see col.11, line 53-col.12, lines 1-42 and col.23, lines 65-67 and col.24, lines 1-11).

As per claims 13 and 17Yousef et al teaches a method of processing a received

signal y to produce a channel estimate comprising: (a) decoding the received signal y to form data s (see figs 7 and 8 elements 106 and 806 and col.17, lines 18-24); (b) forming a convolution matrix from the data s (see abstract and figs. 7 and 8 elements 104 and Y(n) and col.2, lines 65-67 and col.4, lines 45-50 and col.12, lines 30-45); (c) forming a matrix F from the data s, wherein the matrix F results from forming the matrix as a convolution matrix (see figs. 7 and 8 elements 108 and 808 col.2, lines 65-67 and col.4, lines 45-50 and col.12, lines 30-45); and, (d) performing a conjugate gradient algorithm to determine the channel estimate, wherein the conjugate gradient algorithm is based on the received signal y, the matrix , and the matrix F(see fig.7 element 710 and col.16, lines 12-23), wherein the conjugate gradient algorithm includes forming FFTs based on the received signally, the matrix , and the matrix F, multiplying the FFTs to form a multiplication product, and forming an inverse FFT of the multiplication product(see col.11, line 53-col.12, lines 1-42 and col.23, lines 65-67 and col.24, lines 1-11).

As per claims 14, 18 Yousef et al teaches wherein the performing of a conjugate gradient algorithm comprises determining a quantity q.sub.k according to the following equation: q.sub.k=.sup.TSd.sub.k, wherein d.sub.k is dependent upon the received signal y, the matrix , and the matrix F, and wherein q.sub.k is determined by forming a first FFT of the matrix , by forming a second FFT of the matrix .sup.T, by forming a third FFT of the d.sub.k, by multiplying the first, second, and third FFTs to produce a multiplication result, and by forming an inverse FFT of the multiplication result (see col.11, line 53-col.12, lines 1-42 and col.23, lines 65-67 and col.24, lines 1-11).

As per claims 15, 19 and 23 Yousef et al teaches wherein the forming of a

matrix from the data s comprises: forming a matrix S from the data s (see abstract and figs. 7 and 8 elements 104 and Y(n) and col.2, lines 65-67 and col.4, lines 45-50 and col.12, lines 30-45); and, forming the matrix from the matrix S by setting certain values of the matrix S to zero; and wherein the forming of a matrix F from the data s comprises: forming the matrix F from the matrix S by setting to zero the values of the matrix S not set to zero during the forming of the matrix (see col.22, lines 33-45).

As per claims 16, 20, 22and 24 Yousef et al teaches wherein the performing of a conjugate gradient algorithm comprises determining a quantity q.sub.k according to the following equation: q.sub.k=.sup.Td.sub.k, wherein d.sub.k is dependent upon the received signal y, the matrix , and the matrix F, and wherein q.sub.k is determined by forming a first FFT of the matrix , by forming a second FFT of the matrix .sup.T, by forming a third FFT of the d.sub.k, by multiplying the first, second, and third FFTs to produce a multiplication result, and by forming an inverse FFT of the multiplication result (see col.11, line 53-col.12, lines 1-42 and col.23, lines 65-67 and col.24, lines 1-11).

As per claim 20, Yousef et al inherently teaches wherein the performing of a conjugate gradient algorithm to determine the channel estimate h comprises performing the following algorithm: (1) =y-Fh.sub.1, r.sub.1=.sup.T-.sup.Th.sub.1 (2) For k=1 to n, iteratively calculate d.sub.k=r.sub.k+.beta..sub.kd.sub.k-1 (a) h.sub.k+1=h.sub.k+.alpha..sub.kd.sub.k (b) r.sub.k+1=r.sub.k-.alpha- ..sub.kq.sub.k-1 (c) where h.sub.1 is an initial value of the channel estimate, where .beta..sub.1=0, 14 k 2 = r k T r k r k - 1 T r k - 1 , where k = r k T r k d k q k ,where q.sub.k=S.sup.TSd.sub.k

(see col.10-col.11 and col.19-col.20, line 15 equations 55, 64).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yousef U.S. Pub No 2005/0053129 A1 teaches sparse channel dual-error.

Perlow et al U.S. Pub no 20020159543 A1 teaches a system and method for terrestrial high definition.

Karaoguz U.S. Pub No 20020159544 A1 teaches a multi-mode quadrature modulation.

Kaneda et al U.S. Pub No 20050019042 A1 teaches method and apparatus for electronic equalization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571 272 2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Emmanuel Bayard
Primary Examiner
Art Unit 2611

2/2/07

EMMANUEL BAYARD
PRIMARY EXAMINER